

CLAIMS

WHAT IS CLAIMED IS:

1. A communication performance measuring equipment for measuring communication performance of a communication system in which at least one client and at least one server are connected via a network including a plurality of routers, and being communicable with a branching node existing on a path between the at least one client and the at least one server, the communication performance measuring equipment comprising:

a communicating unit for communicating via the network according to TCP/IP;

an input unit for receiving a parameter which includes at least a server identifier for identifying a server and a client identifier for identifying a client or an access point to be used by a client, and represents a communication environment to be evaluated;

a communication controlling unit for controlling communication operation of said communicating unit according to a predetermined procedure, the communication operation being performed for acquiring a predetermined file from a server;

a packet transmitting/receiving unit for transmitting/receiving a predetermined control packet to/from a destination identified by an identifier which is specified according to an inputted transmission instruction;

a situation inspecting unit for collecting information about transmitting/receiving conditions of said predetermined control packet transmitted to each destination and of a predetermined control packet returning from each destination in response to the transmitted control packet;

a primary transmission instructing unit for inputting, to said packet sending/receiving unit, a transmission instruction to specify the client identifier and an identifier for identifying a branching node as destinations, according to receiving conditions of a data packet or a control packet in said communicating unit;

a delay estimating unit for estimating a delay time in transmitting a data packet from a server to a client, based on a predetermined delay model and the collected information about the transmitting/receiving conditions of said predetermined control packet;

a reply controlling unit for adjusting a time instant at which said communicating unit is to transmit an acknowledge packet upon receiving a data packet or a control packet, according to the estimated delay time; and

a performance estimating unit for collecting information about a progress in the communication of said communicating unit, and estimating communication performance on a communication path between the client and the server based on the collected information.

2. The communication performance measuring equipment according to claim 1, wherein: said situation inspecting unit comprises

a transmission detecting unit for recording, for every destination as transmission time, a time instant at which transmission of said predetermined control packet is detected, the transmission being performed by said packet sending/receiving unit to each destination and,

a reception detecting unit for detecting reception of a control packet by said packet sending/receiving unit, the control packet returning from each destination as a response to said predetermined control packet transmitted to each destination, and for recording, for every destination as reception time, a time instant at which the reception is detected,

a time informing unit for informing said delay estimating unit of the transmission time and the reception time of each destination; and

said delay estimating unit comprises

a round-trip time calculating unit for calculating a first round trip time and a second round trip time based on the transmission time and the reception time informed by the time informing unit, the first round trip time being required for said predetermined control packet

to reciprocate between the client and the communication performance measuring equipment, the second round trip time being required for said predetermined control packet to reciprocate between the branching node and the communication performance measuring equipment, and

5 a difference estimating unit for estimating, based on the first round trip time, the second round trip time, and the delay model, a difference between a time required to deliver the data packet or a control packet from the server to the communication performance measuring equipment, and a time required to deliver the data packet or the control packet from the server to the client.

10 3. The communication performance measuring equipment according to claim 1, wherein said input unit comprises:

a path information collecting unit for collecting first path information consisting of identifiers for identifying respective nodes existing on the path from the communication performance measuring equipment to the client, and second path information consisting of
15 identifiers for identifying respective nodes existing on the path from the communication performance measuring equipment to the server; and

a branch detecting unit for detecting an identifier for identifying a branching node by comparing the first path information with the second path information, and for inputting the identifier as a part of the parameter.

20 4. The communication performance measuring equipment according to claim 1, wherein said input unit comprises:

a secondary transmission instructing unit for giving an instruction to said packet sending/receiving unit to transmit, to the client, two control packets having a predetermined form and different data lengths from each other;

25 a round-trip time measuring unit for measuring round trip time of each of the two

control packets, the round trip time being a time taken from transmission of the control packet to reception of an acknowledge packet in response to the transmitted control packet; and

a coefficient estimating unit for estimating a coefficient associated with a factor which varies depending on the size of a packet to be transmitted, in a predetermined delay model representing data transmission between a branching node and the client, and for inputting the estimated coefficient as a part of the parameter, based on the obtained round trip time of each of the two control packets.

5. The communication performance measuring equipment according to claim 2, wherein said delay estimating unit comprises:

an offset calculating unit for calculating, based on a predetermined model, a factor of a delay time due to accumulation of data packets when the data packets are transmitted from the server to the client in a burst mode, and for outputting the resultant as an offset corresponding to the difference obtained by the difference estimating unit; and

a difference output unit for adding the offset to the value estimated by the difference estimating unit, and outputting the resultant as an estimated value.

6. The communication performance measuring equipment according to claim 5, wherein

said delay estimating unit further comprises a stop decision unit for comparing the calculated offset with a predetermined threshold, and for instructing said reply controlling unit to stop the transmission of the acknowledge packet, according to the comparison result.

7. The communication performance measuring equipment according to claim 1, wherein said performance estimating unit comprises:

a first recording unit for monitoring transmitting/receiving operation of a control packet and a data packet performed by said communicating unit, and recording start time

and finish time of each of procedures which are defined in HTTP; and

a duration calculating unit for calculating a difference between the start time and the finish time as a duration for each procedure, and for calculating a sum of the duration of the procedures.

- 5 8. The communication performance measuring equipment according to claim 1, wherein said performance estimating unit comprises:

a second recording unit for monitoring transmitting/receiving operation of a control packet and a data packet performed by said communicating unit, and recording start time and finish time of each of procedures which are defined in FTP; and

10 a duration calculating unit for calculating a difference between the start time and the finish time as duration for each procedure and calculating a sum of the duration of the procedures.